

① Find $A+B$ and $A \cdot B$

$$(a) A = \begin{bmatrix} 1 & 2 \\ 5 & -4 \\ 6 & 0 \end{bmatrix}$$

$$B = \begin{bmatrix} 6 & -2 & 8 \\ 4 & 0 & 0 \end{bmatrix}$$

$$(b) A = \begin{bmatrix} 1 & 5 & 6 \\ 2 & -4 & 0 \end{bmatrix}$$

$$B = \begin{bmatrix} 7 & 5 & 2 \\ 0 & 1 & 0 \end{bmatrix}$$

② Solve with Elimination, Gaussian Elimination, and with the calculator!

$$2x + y - z = 5$$

$$3x - y + 2z = -1$$

$$x - y - z = 0$$

$$\begin{bmatrix} 1 & 5 & 6 \\ 2 & -4 & 0 \end{bmatrix} \cdot \begin{bmatrix} 7 & 3 & 2 \\ 0 & 1 & 0 \end{bmatrix} = \emptyset$$

$$\begin{aligned} \textcircled{3} \quad & 2x + y - z = 5 \\ & 3x - y + 2z = -1 \\ & x - y - z = 0 \end{aligned}$$

$$\begin{aligned} & 2x + y - z = 5 \\ & \underline{3x - y + 2z = -1} \\ & 5x + z = 4 \end{aligned}$$

$$\begin{aligned} & 2x + y - z = 5 \\ & \underline{x - y - z = 0} \\ & 3x - 2z = 5 \end{aligned}$$

$$\begin{aligned} +2(5x + z = 4) \\ 3x - 2z = 5 \end{aligned}$$

$$\begin{aligned} +10x + 2z &= 18 \\ \underline{3x - 2z} &= 5 \\ 13x &= 13 \end{aligned}$$

$$\begin{aligned} 5(1) + z &= 4 \\ z &= -1 \end{aligned}$$

$$x = 1$$

$$\begin{aligned} 2(1) + y - (-1) &= 5 \\ y &= 2 \end{aligned}$$

$$\boxed{x=1 \quad y=2 \quad z=-1}$$

$$2) \begin{bmatrix} 2 & 1 & -1 \\ 3 & -1 & 2 \\ 1 & -1 & -1 \end{bmatrix} \cdot \begin{bmatrix} 5 \\ -1 \\ 0 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix} \leftarrow \text{with calculator}$$

$$\begin{bmatrix} 2 & 1 & -1 & | & 5 \\ 3 & -1 & 2 & | & -1 \\ 1 & -1 & -1 & | & 0 \end{bmatrix} \xrightarrow{\text{Switch } R_1 \leftrightarrow R_3} \begin{bmatrix} 1 & -1 & -1 & | & 0 \\ 3 & -1 & 2 & | & -1 \\ 2 & 1 & -1 & | & 5 \end{bmatrix} \xrightarrow{R_1 \cdot -3} \begin{bmatrix} 1 & -1 & -1 & | & 0 \\ 3 & -1 & 2 & | & -1 \\ 2 & 1 & -1 & | & 5 \end{bmatrix}$$

$$\xrightarrow{R_2 + R_1} \begin{bmatrix} 1 & -1 & -1 & | & 0 \\ 0 & 2 & 5 & | & -1 \\ 2 & 1 & -1 & | & 5 \end{bmatrix} \xrightarrow{R_1 \cdot -2} \begin{bmatrix} 1 & -1 & -1 & | & 0 \\ 0 & 2 & 5 & | & -1 \\ 2 & 1 & -1 & | & 5 \end{bmatrix} \xrightarrow{R_3 + R_1} \begin{bmatrix} 1 & -1 & -1 & | & 0 \\ 0 & 2 & 5 & | & -1 \\ 0 & 3 & 1 & | & 5 \end{bmatrix}$$

$$\xrightarrow{\frac{R_2}{2}} \begin{bmatrix} 1 & -1 & -1 & | & 0 \\ 0 & 1 & \frac{5}{2} & | & -\frac{1}{2} \\ 0 & 3 & 1 & | & 5 \end{bmatrix} \xrightarrow{R_2 \cdot -3} \begin{bmatrix} 1 & -1 & -1 & | & 0 \\ 0 & 1 & \frac{5}{2} & | & -\frac{1}{2} \\ 0 & 3 & 1 & | & 5 \end{bmatrix} \xrightarrow{R_3 + R_2} \begin{bmatrix} 1 & -1 & -1 & | & 0 \\ 0 & 1 & \frac{5}{2} & | & -\frac{1}{2} \\ 0 & 0 & -\frac{13}{2} & | & \frac{13}{2} \end{bmatrix}$$

$$\xrightarrow{\frac{R_3}{-\frac{13}{2}}} \begin{bmatrix} 1 & -1 & -1 & | & 0 \\ 0 & 1 & \frac{5}{2} & | & -\frac{1}{2} \\ 0 & 0 & 1 & | & -1 \end{bmatrix} \quad \begin{array}{l} x - y - z = 0 \\ y + \frac{5}{2}z = -\frac{1}{2} \\ \boxed{z = -1} \end{array} \quad \begin{array}{l} y + \frac{5}{2}(-1) = -\frac{1}{2} \quad x - 2 + 1 = 0 \\ y - \frac{5}{2} = -\frac{1}{2} \quad x - 1 = 0 \\ +\frac{5}{2} \quad +\frac{5}{2} \quad +1 + 1 \\ \boxed{y = 2} \quad \boxed{x = 1} \end{array}$$

On Calc.

$$\begin{bmatrix} 2 & 1 & -1 \\ 3 & -1 & 2 \\ 1 & -1 & -1 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ -1 \\ 0 \end{bmatrix}$$

$A \quad \cdot \quad X \quad = \quad B$

$$X = A^{-1} \cdot B$$

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Chapter 7:

- ① [Linear Systems Review Handout](#)
- ② Sect. 7.1 #15-18(do 2), 67, 70, 71
Sect. 7.2 #7-15(do 2), 8, 10, 61, 63, 67
- ③ Sect. 7.3 #2,9,13,16,37,40
- ④ Sect. 7.3 #14,15,17,18,19
- ⑤ Sect. 7.4 #2-12(even), 55, 59
Sect. 7.5 #3,5,26,28,29
- ⑥ Sect. 7.6 #1, 13, 15, 17, 26, 41, 42, 44
Sect. 7.7 #1-4, 51

Done